

measured along the median line above equal eleven lines; one of these is 3.6 lines in width above; width of a (?) posterior caudal 3 l.

This animal has been, like *Amphiuma*, a snake-like Batrachian, but probably of even more elongate form. How near its affinities to this genus may be, cannot be ascertained, owing to want of important parts of the skeleton, but it differs in the important feature of the large, well developed ribs.

LABYRINTHODONTIA.

DITCYOCEPHALUS Leidy.

DITCYOCEPHALUS ELEGANS Leidy, Proc. Acad. Nat. Sci., 1856, 256. Emmons Geology North Amer., p. 59. Tab. 31.

Triassic Coal Measures, Chatham Co., N. Carolina.

CENSTEMODON Lea.

CENSTEMODON SULCATUS Lea, Proc. Acad. Nat. Sci., Phila., 1856, 78.

Triassic Shales near Phoenixville, Chester Co., Penn.

BAPHETES Owen.

BAPHETES PLANICEPS Owen, Quart. Journ. Geol. Soc. Lond. x, 1853, (xi, notes).

Carboniferous Coal Measures of the Joggins, Nova Scotia.

EUPELOR Cope.

Gen. nov. *Char.* Teeth subcylindric, with large pulp cavity at the basis only; external surface without grooves; dentine divided by numerous flat vertical laminae of a dense substance, probably enamel, which radiate from very near the pulp cavity to the external enamel layer.

The species on which this genus depends was originally described by the writer as a *Mastodonsaurus*. The latter genus, however, exhibits external grooves where the inflections of enamel enter and separate the dentine. These inflections, as is well known from the figures and descriptions of Professor Owen, are more or less convoluted, some of them very highly so. The laminae of the teeth of the *Eupelor* cannot be looked upon as inflections of enamel, but rather as branches. They are exceedingly thin, and our sections do not demonstrate them to be double. If they are double they are very much more attenuated than the external enamel stratum. They may be distinguished in a section of the wall of the pulp cavity at the base of the root as well as elsewhere.

EUPELOR DURUS Cope, *Mastodonsaurus durus* Cope. Proceed. Acad. Nat. Sci., Phila., 1866, 249.

From the Triassic Red Sand Stone near Phoenixville, Chester Co., Penn.

On AGAPHELUS, a genus of toothless Cetacea.

BY EDW. D. COPE.

During the autumn of 1866 a whale was cast ashore on the Long Beach, Ocean Co., N. J., opposite Westcunk, on the other side of Little Egg Harbor, near the residence of Wm. A. Crane. A recent visit to the spot furnished me with the means of determining the species to which this monster of the deep belonged, although not with the completeness desirable, as the tide had a short time previously taken off the most bulky part of the carcass. Thus the cranium, cervical and dorsal vertebrae, with the first ribs, the most important portions for its identification, were lost. There were preserved, however, the mandibular arch, ear-bone, one scapula and both fins, numerous ribs, many 1868.]

lumbar and caudal vertebræ, with the baleen from one side of the maxilla. These portions, with a few prominent points dependent on the observations of Wm. A. Crane, serve to indicate a species not only new to our fauna, but new to modern science. The evidence of my informant, as that of an old and experienced coaster and waterman, and one familiar with the appearance of our cetaceans, confirmed by his sons and by the specimens preserved, so far as they went, I consider reliable. That the species should have remained undescribed until the present time will not appear surprising to those who read carefully Gray's recently issued "Catalogue of Cetaceans," or Eschricht and Reinhardt "Om Nordhvalen," Copenhagen, 1861.

The scapula preserved is low and elongate, with well-developed acromion and coracoid process. It is evidently of the type of *Balænoptera* and *Physalus*; the ulna and radius relatively less elongate than in *Sibbaldius laticeps* and *borealis*, being 1.5 as long as the humerus, thus resembling *Physalus*. The four fingers, with the second much the longest, form a fin of the type of these genera. The ear-bone is much more compressed than in *Physalus antiquorum* or *Sibbaldius laticeps*. The mandibular ramus is rather massive, moderately curved, and with a more elevated coronoid process than in any whale that I have seen. The greatest peculiarity is in the form of the lumbar and anterior caudal vertebræ; they are of a much more elongate form than any I have seen or found figured, excepting those of the *Balænoptera rostrata* (as figured by Gaimard in *Voyage de la Recherche*), which, however, are relatively shorter. Those of the present species are of greater length than transverse diameter, the lumbar most elongate; all furnished with an acute hypapophysial keel and concave sides, and entirely transverse diapophyses. This peculiarity is consistent with the account of my informant, who stated the animal to have been of an unusually elongate and slender form. When it came ashore it had perhaps been dead ten days; the flukes and muscular region as far as the third caudal vertebra had been devoured, probably by sharks and killers, and the abdominal region much lacerated; the edge of a fin preserved was slit by the teeth of some carnivorous enemy. The measurement from the end of the muzzle to the end of the third caudal was 35 feet, which may be reduced to 33 feet axial. Up to this point the dorsal line was, according to my informant, entirely smooth, without knob or fin, or scar of one; hence I suppose the fin (if present) to have been situated as in *Sibbaldius*, &c., at the posterior fourth of the length, and not as in *Balænoptera*, on the posterior third. It may then be safely assumed, bearing in mind the form of the vertebræ, that ten feet of the whale's length had been removed, making in all 43 feet. That the species attains over 50 feet is probable, as the present individual was quite young, the epiphyses separating from the vertebræ with the greatest ease. The slender form of the animal is corroborated by the slenderness and slight curvature of the ribs, one attached beneath the scapula, probably the second, being narrower than the corresponding ones in *Sibbaldius*. I therefore think it most probable that in this form the anterior ribs are single-headed.

The baleen is peculiar; throughout the length of the maxillary bone it nowhere exceeded one foot in length, and the width of the band, or length of the base of each plate, four inches. It is of a creamy-white; the fringe very coarse, white, and resembling hogs' bristles.

The proportions in most respects present a contrast to those of *Physalus* species, and *Sibbaldius* species. While the cranium and fin of the *Physalus antiquorum* are of about equal length, the latter is four-sevenths the former in the present species. In the *Physalus* the cranium enters the length 4.7 times; in *Sibbaldius laticeps* 4.06, and in the present species 6.6 times; in *Balænoptera rostrata* 4.5 times.

In general features this Cetacean seems to be an intermediate form of the toothless whales; and an additional feature, which depends on the observation of my friend W. Crane, and in which I cannot conceive it possible that he should be mistaken, indicates still more conclusively that it pertains to a genus

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not before characterized. The whale was first driven on shore on its back, and the gular and thoracic regions were seen to be entirely without ridges or plicæ of any kind, but as smooth as any other part of the body, or as the throat of a right whale, *Balæna cisa rctica* Cope, which is not uncommon on the same coast.

This my informant told me was the species known among the whalers as the "Scrag Whale." Though this name is indefinite when applied by whalers of different nationalities, it is probably used with accuracy by those accustomed to any particular region. At any rate I have little doubt that this is the species called by the same name by Dudley, who in 1725 wrote an account of the whales known by the whalers of the coasts of New England. He says it is near the right whale (*B. cisa rctica*) in figure also; "is near akin to the fin-back, but instead of a fin upon its back, the ridge of the after part of its back is scragged with half a dozen knobs or knuckles. He is nearest the right whale in figure and quantity of oil. His bone is white, but won't split." This is published, with an account of the other species known, in the 33d volume of the Philosophical Transactions. He mentions particularly the fin-back and hump-back whales, describing the deep folds of the chin, throat and sides of those genera. There can be little doubt that his "scrag whale" had a smooth throat like the *Balæna*, and not a plaited one like the *Balænopteras* and their allies. By the preceding account it has been shown that the species has but four slender fingers at the carpus; hence it is obviously the type of genus intermediate between *Balæna* and *Megaptera*, not hitherto recognized,—furnished, however, with the scapula of *Balænoptera*.

Captain Atwood, a resident of a part of the peninsula of Cape Cod, Mass., who is a good observer of the life of the ocean, thus writes of the scrag whale in J. A. Allen's Catalogue of the Mammals of Massachusetts, in the Proc. Boston N. H. Soc. for 1868:

"Scragg.—A species of whale known by this name, and nearly allied, if not identical with the right whale, is sometimes taken here. It is the opinion of many of our whalemen that they are not a distinct species, but are the young right whale that lost its mother while very young, and has grown up without parental care, which has caused a slight modification. The most prominent feature is on its dorsal ridge; near the tail there are a number of small projections or bunches, having some resemblance to the teeth of a saw. It has no dorsal fin or hump on its back."

Additional evidence of the existence of this genus has been furnished by the Smithsonian Institution. In accordance with recommendations and directions furnished by the writer, Wm. H. Dall, the enterprising director of the West Coast Scientific Exploring Expedition, originally commanded by Dr. Kennicott, sent to the Institution drawings and descriptive notes of the grey whale of the coasts of Upper and Lower California. The writer has also examined an almost complete set of whalebone, with some other portions of the same species, in the museum of the Essex Institute, at Salem, Mass. The baleen is similar in character to that of the present species, but presents specific differences. The notes of Capt. Dall indicate a long-finned, smooth-throated whale, with a flat-pointed head like a fin-back, and no dorsal fin, but a series of knobs on the posterior region of the back. That it in all respects conforms to the generic type of the Atlantic species, can be determined from the description which follows.

The Atlantic species was named from Dudley's description by the compiler, Erxleben, without his adding to our knowledge of it, *Balæna gibbosa*. I will follow Dr. Gray in adopting this name. The latter author, in his excellent Catalogue of Seals and Whales in Brit. Mus., refers it, on the basis of the same description, to *Balæna*, with doubt.

Genus AGAPHELUS Cope.

Fingers four, elongate. Cervical vertebræ? Lumbar and anterior caudal 1868.]

vertebræ longer than their greatest diameter. Dorsal fin wanting. Gular and pectoral region without folds. Scapula with well developed acromion and coracoid. Balæen narrow, short.

AGAPHELUS GIBBOSUS Cope.

Scrag Whale, Dudley, Philos. Trans. xxxiii., 250, and of The Whalers.

Balæna gibbosa Erxleben, Systema Mammalium 610 (from Dudley), and after him of Gmelin, Bonnatere, Lacepède, Virey, Gerard, Desmarest & Fischer.

Gray, Catal. Brit. Mus. 1850, p. 18, and 1866, p. 90.

Agaphelus gibbosus Cope, Proc. Ac. N. Sci. Phila., 1868, 159.

Balænoptera rostrata Cope, Proc. Ac. Nat. Sci., Phila., 1867, 147.

	Ft.	In.
Total length (estimated) of young.....	43	
Length of third caudal vertebra.....	33	
Length of cranium (estimated).....	6	10
“ mandibular ramus (in curve).....	6	
“ pectoral limb.....	4	
Width of “ “.....		15
Length of humerus.....		11.5
“ radius and ulna.....		17
Posterior margin of scapula.....		14
Length of coracoid from glenoid cavity.....		3.3
“ glenoid cavity.....		6.3
Mandible, length from condyle to coronoid.....		13.5
“ depth at coronoid.....		8.5
“ “ 2.5 feet from coronoid.....		4.6

The form of the mandibular ramus is peculiar, and more like that of the *Balænoptera rostrata* than any other. It is triangular in section, having an inferior angulated ridge, and a broad, slightly convex, superior face, instead of their usual ridge. Such a ridge leaves the coronoid process, but soon turns inwards to form the inner outline. Width of the superior face 3.5 inches. The coronoid process is quite elevated, and turned outwards. In the fresh animal the lower lip included the upper all round. The laminae of whalebone are placed on a base having a sigmoid flexure. Greatest depth of the gum 1 in. 3 lines. Within each principal lamina are two supplementary laminae, the intermediate being the narrower, the inner triangular, its intermediate bristles arising from the gum. The bristles of the supplementary plates are longer and finer than those of the outer; in the latter, three series of bristles are enclosed between very thin enamel plates. All the laminae are thin, five in an inch, and split transversely straight; white cream-colored, with a purplish shade near the centre of the base. The ulna is slender, but furnished with a prominent rounded and flattened olecranon, which is prolonged into a thin cartilaginous plate, formed like the diapophysis of a vertebra, and in the plane of the ulna; this structure appears to have been ossified in the *Sibbaldius borealis* Fisch., as figured by Dubar. In the *Agaphelus gibbosus* it occasions an abrupt angulation near the basal third of the inner margin of the fin. In the scapula, the coracoid is in its plane, but the larger acromion diverges outwards.

The anterior caudal vertebrae are more elongate than the lumbosacral, less depressed, and with the centra in every way larger. All are sharply keeled on the median line below, with a concave face between the keel and the base of the diapophysis. The caudal and lumbosacral diapophyses are obspatulate, the anterior becoming narrower. The neural spines of the lumbar vertebrae are much elevated, concave above both before and behind, the zygapophysis measuring a point considerably below the middle.

	In.
Third (?) caudal (not perforate) length centrum.....	7.3
depth.....	6
width.....	6.5

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	height neural spine.....	9.5
	zygapophysis.....	4.3
	length diapophysis (from front base).....	3.3
Lumbosacral 1;	length centrum.....	7.3
	depth.....	5.3
	width.....	6.3
	height neural canal.....	2.5
	width.....	1.5
*	height neural spine.....	15.3
	zygapophyses.....	5.5
	length diapophysis.....	7.5
	greatest width do.....	5.3
Lumbosacral 2	(more anterior) length centrum.....	6.3
Lumbosacral 3	(anterior) height centrum.....	4.3
	width ".....	6
	length diapophysis.....	7.7

The ear bone is much compressed, with an inferior carina, towards which the lip of dense bone is suddenly decurved. The longitudinal opening is much contracted, especially anteriorly, where the bone is pinched up into a keel, and there is no abrupt concavity of the inner lip at that point. External surface not very rugose. Total length 3 in. 2.5 lines.

The owner of the whale tried out about one-fourth of the blubber, and procured sixty-five gallons of oil, which would give about four hundred gallons for the whole; the thickness of the adipose layer would not average 4 inches, the greatest thickness was 5 inches.

This species was black above and white below, the sides lead-colored, with longitudinal shades of the darker color; fins, basal half white, terminal black.

AGAPHELUS GLAUCUS Cope, sp. nov.

The points in which this species differs from those of the genus *Balæna*, previously known, are numerous, and will no doubt be increased on a further knowledge of the animal. The head, between one-fourth and one-fifth of the total length, allies it to the shorter headed species. From the *B. australis*, the number of dorsal vertebræ, and the color and shortness of the baleen, distinguish it, and no doubt other features will be brought out when we are acquainted with the Cape species. The dorsal serration is not known to occur in any species of the genus *Balæna*, though said to be characteristic of the *A. gibbosus*, whose characters I have just given. Two *Balæna* have been described as inhabiting the north Pacific Ocean, *Balæna sieboldii* Gray,* and *Balæna cullamach* Chamisso.† Both have been established on figures carved by the natives of the Japanese and Aleutian Islands respectively, the former under the supervision of a naturalist, the traveller Siebold. The carving of the *B. cullamach*, judging from the figure given by Chamisso, can but doubtfully represent any species, but which, if it exist, will rest on the following diagnosis of its describer: "Rictu amplo forma litteræ Scurvato, elasmis maximis atrocoruleis, spiraculis flexuosis in medio capite, tuberculo in apice rostri (ex imagiue) pectore pinnisque pectoralibus albis dorso gibboso sexpinnato."

These are, however, true *Balæna*. A species of *Agaphelus* exists in the Kamtschatkan Seas, according to Pallas, who, however, derives his information solely from wooden models made by Aleutian Islanders. This is not sufficient basis for an introduction to the scientific system, yet Pallas indulges in applying to it the name *Balæna agumachschik*. The pectoral limb of this species is said, however, to be white, with the under side of the flukes, charac-

* Catalogue Cetaceans, 1865, 96, Fauna Japonica, Temminck & Schlegel, t. 28, 29.

† Nova Acta Acad. Caes. xii., p. 251, Tab.

ters not found in the *A. glaucus*. Dr. Gray has already (Catal. Brit. Mus.) indicated that this, if reliable, indicates a genus unknown to him.

The *Agaphelus glaucus* is the gray whale of the coasts of California. Two specimens have been examined by my friend, Wm. H. Dall, of the Scientific staff of the U. S. Russian American Telegraph Expedition, one of them near Monterey, and descriptions as complete as the state of the specimens would allow, were made. These, which were sent to the Smithsonian Institution, and placed in my hands by Prof. Baird, are quite sufficient to indicate a whale of a species hitherto unnoticed, and to render certain its future identification.

Specimen No. 1, a skeleton nearly complete.

	Ft.
Length of cranium.....	10
Of dorsal vertebræ.....	12
Lumbar and caudal (except of the fluke).....	26
? Vertebræ of fluke.....	? 3
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Total.....	51

Dorsal vertebræ and ribs, thirteen; lumbar and caudal (those in the fluke cut off with it), 28. Scapula, breadth and height not very different, with a short, broad coracoid process; its head opposite first rib. Apparently only four fingers, of which the second is the longest. 145 laminae of baleen on each side, the longest eighteen inches long; color light yellow.

Specimen No. 2, killed by the "killers," (orca); skeleton still concealed by mass of muscle, etc.

External measurements.

	Ft.
Flukes to anus.....	14½
Anus to sulcus penis.....	2
Length of sulcus.....	1½
Latter to plane of flippers.....	15
Plane of flippers to end of mandible.....	15
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Total.....	48

The lower jaw is four inches longer than the upper; the blow-holes are entirely concealed by four dermal plicæ, which accounts for the small misty spout peculiar to the species.

	Ft.	In.
Length of flipper and shoulder.....	6	
" mouth.....	10	
" exterior canthus of mouth.....	1	6
" from chin to eye.....	10	4
" from eye to margin of canthus.....	4	6
Width of caudal flukes.....	8	9
Width of mouth at canthus.....	4	
From chin to blow-holes.....	4	9
Longest baleen.....		14

Head of humerus opposite third rib; anterior angle of scapula just anterior to first rib. On the vertebral line, for fourteen feet from the caudal flukes, is a series of 18 ridges, like the teeth of a saw, which are altogether dermal in their character. Blubber 4—8 inches thick, thickest near the jaws and on the back near the tail; yield of oil 35 bbls. Epidermis 1 inch thick, carium .75, with numerous pores. Blow-holes 2—4 inches apart. On each side of sulcus penis a mammary sulcus a few inches shorter.

Color above and below, black, with a gray bloom like a plum. This distinguishes this species from the known *Balanæ* of the Pacific, which are more or less white on the belly and fin.

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Specimen No. 3. A full set of baleen of one side the maxillary is in the Mus. Essex Institute, Salem, Mass. A portion of this, kindly lent me, exhibits the following characters: Compared with that of the *A. gibbosus*, it is longer and has narrower basis. The plates moderately and simply concave, while those of the latter are sigmoidal, most curved near the outer margin, in cross section. The bristles of the California species are very coarse, varying from one to three series between the enamel plates. The bristles of the *A. gibbosus* much finer, three series together. Length of the latter 8.5 inches, width at base 4.4 inches. In the *Agaphelus glaucus* Cope, 22 in. in length, width at base 6 in. In the former nearly 6 in an inch, in the latter 2½. The baleen of the *A. gibbosus* belonged to the specimen above described.

Two rough outlines accompany Capt. Dall's notes. Both represent the pectoral fin as rather elongate, not pointed, but rather broad at the extremity. A third sketch represents the inferior view, and in it we see two lines for grooves, one on each side the median gular line. This feature, if existing, is interesting, as indicating a tendency to the plicæ of the fin back whales.

This species has usually one calf at a birth, but one was recently taken at San Diego with two fœtus. Penis 27 in. long, smooth, coarsely papillose, slightly bifid at tip, where the urethra is about the size of a goose quill. (Dall's m. s.)

Oct. 6th.

The President, DR. HAYS, in the Chair.

Thirty-five members present.

The following paper was presented for publication:

Notice of some American Leeches. By Joseph Leidy, M. D.*

Oct. 13th.

MR. CASSIN, Vice-President, in the Chair.

Thirty-four members present.

The following papers were presented for publication:

Notice of some Remains of Extinct Vertebrata. By Joseph Leidy, M. D.

On the Origin of Genera. By Edward D. Cope.

On some Cretaceous Reptilia. By Edward D. Cope.

On variations in *Taxodium*. By Thomas Meehan.

Oct. 20th.

The President, DR. HAYS, in the Chair.

Thirty-six members present.

Dr. F. A. Genth made some observations on the occurrence of cupriferous ores in Texas.

Dr. A. R. Roessler, Geologist at the U. S. General Land Office at Washington, had sent him for examination a specimen from Weatherford, Archer Co., Texas. It was a piece of copperglance, containing 55.44 per cent. of copper, pseudomorphous after wood or a vegetable substance. It resembled so much similar pseudomorphs found in the Permian formation at Frankenberg in Hesse, and 1868.]